



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|-------------------------|--------------------------------|------------------|
| 10/536,821 | 05/27/2005 | Andrew Douglas Bankhead | AMTH-101US | 6629 |
| 23122 | 7590 | 04/16/2008 | | |
| RATNERPRESTIA P O BOX 980 VALLEY FORGE, PA 19482-0980 | | | EXAMINER HANSEN, JONATHAN M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2886 | |
| | | | MAIL DATE | DELIVERY MODE |
| | | | 04/16/2008 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|---------------------------------------|---|--|
| Office Action Summary | Application No. 10/536,821 | Applicant(s) BANKHEAD, ANDREW DOUGLAS | |
| | Examiner JONATHAN M. HANSEN | Art Unit 2886 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 104-123 and 125-127 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 127 is/are allowed.
- 6) ☒ Claim(s) 104-110, 115-117, 121-123, 125 and 126 is/are rejected.
- 7) ☐ Claim(s) 111-114 and 118-120 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/26/08 has been entered.

Response to Arguments

Applicant's arguments filed 03/26/2008 have been fully considered but they are not persuasive.

In regards to the applicant's arguments that Deck fails to disclose an image enhancer operable to enhance image data representing a set of light intensity data to be displayed on a display to facilitate the detection by a user of the interference fringes, the Examiner respectfully disagrees.

It is noted by the Examiner that the computer, which is relied upon as the applicant's image enhancer, is disclosed to include one or more computer programs which is executed by a microprocessor of the computer to process the interference data.

Attention is now brought to lines 4-17 of column 9 and Figures 3A and 3B of Deck, wherein the interference data, which is acquired by the CCD (36), is represented as intensity curves, in Figure 3A, and contrast curves, in Figure 3B. Deck further discloses that the contrast curves are calculated from the intensity curves in a number of ways, all of which involve low pass filtering to eliminate the high frequency interference (col. 9, ll. 5-14). This is understood by the Examiner to be image enhancement due to the fact that the image data is being filtered to remove high frequency interference. Further, due to the facts that this filtering is part of a calculation and, as stated above, the computer includes one or more programs to process/calculate the interference data, Deck is understood by the Examiner to disclose an image enhancer that enhances the acquired interference data.

It is further noted that while Deck is silent to the explicit displaying of intensity curves (51a and 52a) and contrast curves (51b and 52b), the apparatus of Deck

determines a “test surface profile” that is “displayed in a conventional fashion”; wherein the test surface profile is determined from the high contrast peaks shown by the contrast curves which are derived from the intensity curves. Therefore, one of ordinary skill in the art would recognize that Deck does disclose a computer (applicant’s image enhancer) to filter and derive interference data (applicant’s enhance image data) that is to be displayed as a test surface profile, also referred to as a 3D interferogram.

In regards to the applicant’s arguments that Deck fails to disclose “each set of light intensity data consisting of frame data sensed at one interval along the measurement path”, the Examiner respectfully disagrees.

Attention is first brought to column 7, lines 40-46 of Deck, wherein the sensor is disclosed as a two dimensional array which is preferably a CCD. While Figures 3A and 3B illustrate intensity and contrast curves for a single pixel of said CCD, it is further disclosed by Deck that this is done merely to reduce the amount of acquired data (col. 7, ll. 47-65). Deck discloses that the framegrabber acquires and saves consecutive images or frames (applicant’s frame data) while the interferometer is scanned. Each consecutive frame contains interference data, and each frame corresponds to a specific optical path difference (applicant’s interval). One of ordinary skill in the art would recognize that while the surface height is determined for each pixel, as illustrated by Figures 3A and 3B, the CCD would acquire interference data for the entire test surface as the interferometer is scanned.

In regards to the arguments that the secondary references to Ai and Webster do not overcome the deficiencies of Deck, attention is brought to the discussion above.

Claim Objections

Claims 105 and 106 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims **104-107, 115, 121-123, 125 and 126** are rejected under 35 U.S.C. 102(b) as being unpatentable by **US Pat. # 5,953,124 to Deck**.

With regard to claims **104 and 126**, Deck discloses a surface profiling apparatus for obtaining surface profile data for a sample surface, the apparatus comprising:

a light director (col. 7, ll. 15; fig. 1, 22);

a mover (col. 7, ll. 24; fig. 1, 32);

a sensor (col. 7, ll. 46; fig. 1, 36);

a data processor (col. 7, ll. 61-65; wherein the microprocessor of the computer is viewed as the processor); and

a surface profiler (col. 7, ll. 65 to col. 8, ll. 30; the 3D interferogram of line 26 is viewed as the generated surface profile.);

the apparatus further comprising an image enhancer (col. 7, ll. 61-65; wherein the computer is viewed as the image enhancer that is connected to a display.);

wherein the image enhancer comprises a gradient determiner or a contrast determiner to determine from a set of light intensity data light intensity gradient data or contrast difference data and a modifier operable to modify the image data to be displayed in accordance with the determined gradient data (col. 7, ll. 61-65; wherein the computer is viewed as the image enhancer and the framegrabber is viewed as the modifier. Also, Col. 5, ll. 29-50; wherein the height determination and contrast determination are done within the computer.).

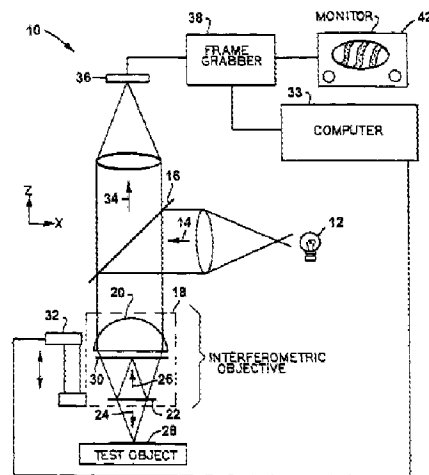


FIG. 1

As to claim **122**, the claimed method merely discloses the steps performed by the device; the method would be inherent in view of the device.

As to claims **105, 106 and 107**, Deck discloses an apparatus, wherein the image enhancer comprises a gradient determiner or a contrast determiner operable to determine from a set of light intensity data light intensity gradient data or contrast difference data and a modifier operable to modify the image data to be displayed in accordance with the determined gradient data (col. 7, ll. 61-65; wherein the computer is viewed as the image enhancer and the framegrabber is viewed as the modifier. Also, Col. 5, ll. 29-50; wherein the height determination and contrast determination are done within the computer.).

As to claim **115**, Deck discloses an apparatus, further comprising a user operable device that enables a user to select the reference set (col. 10, ll. 18-30; wherein the reference pixel is selected within the computer. It is inherent that computers have controllers to make them user operable.).

As to claim **121**, Deck discloses an apparatus, further comprising a surface form extractor (col. 7, ll. 65 to col. 8, ll. 30; wherein the surface form extractor is viewed as the same as a surface profiler.).

As to claim **123**, Deck discloses a method, further comprising determining from the positions at which the predetermined feature occurs in the light intensity data for the different sensed regions the relative surface heights of the different sensed regions to provide a surface profile (col. 5, ll. 40-43).

As to claim **125**, Deck discloses a storage medium carrying processor-implementable instructions for causing processor means to carry out a method (col. 7, ll. 61-65; wherein the computer contains a storage medium for the executable software.).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 2886

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims **108-110** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Deck**, and in view of **US Pat. 5,471,303 to Ai et al.**

As to claims **108 and 110**, Deck further discloses the pixels are in the x-y plane and use x-y coordinates (col. 8, ll. 50-51). Deck substantially discloses the claimed invention however, he differs from the limitations of claims 108 and 110 in that he does not explicitly disclose comparing the light intensity data values associated with regions on either side of the region that provided the light intensity data value.

Ai teaches the determination by reference to a region or a plurality of adjacent pixels (col. 10, ll. 35-42).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Deck to compare adjacent regions for the advantages of very consistent and repeatable height measurements, as taught by Ai.

As to claim **109**, Deck substantially discloses the claimed invention however, he differs from the limitations of claim 109 in that he does not explicitly disclose an apparatus, wherein the regions are arranged in a rectangular array.

Deck discloses a square CCD array (col. 7, ll. 40-46).

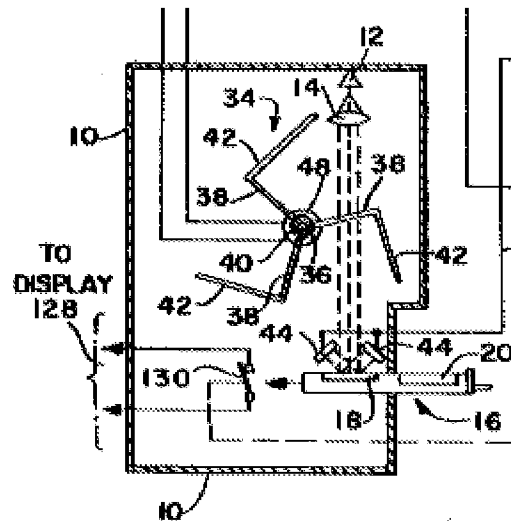
It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the square CCD of Deck into a rectangular array for the advantages of having a larger imaging area.

5. Claims **116 and 117** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Deck** as applied to claim 104 above, and further in view of **US Pat. 4,040,747 to Webster**.

With regard to claims **116 and 117**, Deck substantially discloses the claimed invention however, he differs from the limitations of claims 116 and 117 in that he does not explicitly disclose an apparatus, wherein a filter assembly mounted in a light path from the light source and having a housing having a filter carrier mounted in the housing so as to be rotatable about an axis, the filter carrier having a plurality of filters spaced around the axis and having a peripheral surface provided with land portions each associated with a corresponding filter and each distinguishable by a user for allowing a user to rotate the filter carrier to bring a selected filter to a predetermined position.

Webster teaches and shows in Figure 1 (shown modified below) a multiple filter assembly in the form of a paddlewheel that is rotatable about an axis (col. 4, ll. 1-11). The figure below shows a filter assembly (fig. 1, 34) mounted in a light path from the light source (fig. 1, 12) and having a housing (fig. 1, 10) having a filter carrier mounted in the housing so as to be rotatable about an axis (fig. 1, 40), and the filter carrier having a plurality of filters spaced around the axis (fig. 1, 38).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Deck to include a rotatable filter assembly for the advantages of sweeping the frequencies of the light source, as taught by Webster.



Allowable Subject Matter

6. Claim **127** is allowed.

As to claim **127**, the prior art of record, taken alone or in combination, fails to disclose or render obvious a reference calibrator operable to calibrate the apparatus to compensate for surface features of the reference surface, the reference calibrator comprising: a user operable calibration initiator operable to initiate a calibration; a calibration controller operable to cause, in response to operation of the calibration measurement initiator, operation of the controller, data processor and surface topography determiner to carry out a number of calibration measurement operations to

obtain in each calibration measurement operation calibration surface topography data for the calibration sample, in combination with the rest of the limitations of the claim.

7. Claims **111-114 and 118** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claim **111**, the prior art of record, taken alone or in combination, fails to disclose or render obvious the modifier is operable to determine a modified intensity data value IM for a light intensity data value I associated with the region at coordinates x,y in accordance with: $IM = 64 + V2 + (I-i - I+i)X4$ where $I+1$ and $I-1$ are the intensity data values associated with the regions at coordinates $x+l, y+l$ and $x-l, y-l$, respectively, in combination with the rest of the limitations of the claim.

As to claim **112**, the prior art of record, taken alone or in combination, fails to disclose or render obvious the contrast determiner is operable to means is arranged to determine the contrast difference data by subtracting from the intensity data value I of the set the corresponding intensity data value IR of the reference set, in combination with the rest of the limitations of the claim.

As to claim **113**, the prior art of record, taken alone or in combination, fails to disclose or render obvious the modifier is operable to determine a modified intensity

Art Unit: 2886

data value IM for a light intensity data value I in accordance with: $IM = 64 + 1/2 + (I - IR) \times 4$ where IR is the corresponding intensity data value of the reference set, in combination with the rest of the limitations of the claim.

As to claim **114**, the prior art of record, taken alone or in combination, fails to disclose or render obvious the modifier is operable to determine a modified intensity data value IM for a light intensity data value I associated with the region at coordinates x,y in accordance with: $IM = 64 + 1/2 + (I - IR) \times 4 + (I-i - I+i) \times 4$ wherein I+i and I-i are the intensity data values associated with the regions at coordinates x+i, y+i and x-i, y-i, respectively, and IR is the corresponding intensity data value of the reference set, in combination with the rest of the limitations of the claim.

As to claim **118**, the prior art of record, taken alone or in combination, fails to disclose or render obvious the image enhancer is operable to cause the majority of the light intensity data values to appear to be represented by a single color with the apparent lightness of the color varying with the light intensity data value such that the lightness either increases or decreases with increase in the light intensity data value and to cause at least one of a light intensity data value representing a highest light intensity, a light intensity data value representing a lowest light intensity and light intensity data values representing midrange light intensities to be displayed so as to appear to be of a different color to enable the user to identify the light intensity level

represented by that light intensity data value, in combination with the rest of the limitations of the claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN M. HANSEN whose telephone number is (571)270-1736. The examiner can normally be reached on Monday through Friday 9:30AM to 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on 571-272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/536,821
Art Unit: 2886

Page 15

JMH
/TARIFUR R CHOWDHURY/
Supervisory Patent Examiner, Art Unit 2886